

From: [PETERSON Jenn L](#)
To: [Jay Field](#); [Eric Blischke/R10/USEPA/US@EPA](#)
Cc: [Burt Shephard/R10/USEPA/US@EPA](#); [Robert Neely](#); [Joe Goulet/R10/USEPA/US@EPA](#); [Mary Baker](#)
Subject: RE: Bioassay Evaluation
Date: 07/15/2008 09:19 AM

This approach essentially is similar to the one hit approach laid out by RSET, with the exception of being more extreme in the evaluation of "one hit" - esp. for the Hyalella growth endpoint. At this point, the RSET approach would be better, in that at least it would identify two lower responses as a "hit". Without site-specific benthic community evaluations on diversity or abundance, we were relying on sensitive endpoints such as growth to feed back to the assessment endpoints (protection of survival, growth and reproduction of the benthic community). At this point, I believe it is important for EPA to define the objectives of the model in the risk assessment (e.g. how it ties in with the assessment endpoints), and subsequent defense of the selected thresholds to meet those objectives. Based on the thresholds presented, its place in the risk assessment is questionable, and I am particularly concerned about interpretation of model results at these extremes in terms of evaluating risk.

Despite LWG's claims that low thresholds cannot be distinguished with the Hyalella growth endpoint, at least for the FPM this has not been presented for review (e.g. in the Round 2 Report), and to my knowledge the model predictions at different thresholds identified earlier in the process (10, 20, 30) have not been evaluated by EPA. It is also unclear why model thresholds would deviate significantly from the empirical thresholds for the purposes of defining risk to the benthic community.

-Jennifer

-----Original Message-----

From: Jay Field [mailto:Jay.Field@noaa.gov]
Sent: Monday, July 14, 2008 9:42 PM
To: Blischke.Eric@epamail.epa.gov
Cc: Burt Shepard; Robert Neely; PETERSON Jenn L; Joe Goulet; Mary Baker
Subject: Re: Bioassay Evaluation

Eric,
I assume from item #6 that you are proposing to derive new LRMs based on

the thresholds you identified. The proposed thresholds, which I consider to be extreme, will make the development of reliable logistic regression models highly unlikely because of the small number of "hit" samples. The basis for the new growth thresholds is not clear, given that all of the growth results with less than 80% of control were statistically different from the control. If your intent is to incorporate risk management decisions into the models, I would recommend

applying those concepts to model application, not model development. Please let me know if I can provide further assistance.
Jay

[6] The evaluation of the bioassay data for the development of the predictive models will be based on the following hit thresholds:

- Chironomus Growth - 30%
- Chironomus Mortality - 20%
- Hyalella Growth - 40%
- Hyalella Mortality - 20%

Blischke.Eric@epamail.epa.gov wrote:

> All,
>
> We have been discussion the evaluation of the bioassay at length over
> the last month or so and off and on for the last four years. In
> general, I believe that the empirical toxicity test results is our
> strongest line of evidence for evaluating effects on the benthic
> community. However, I recognize the need to develop site specific
> predictive models to assist the evaluations of stations where sediment

> toxicity test results are not available. At the heart of this
> discussion has been the use of the Hyalella growth endpoint in the
> predictive models.
>
> An evaluation of the empirical Hyalella growth data suggests that
> Hyalella growth at the 10% and 20% difference from control hit
> thresholds can be used to delineate the extent of contamination at the

> Portland Harbor Site. However, LWG representatives have maintained
> that, on a chemical by chemical basis, it is not possible to see a
> difference between the hit and no-hit distributions at these levels.
> As a result, the Round 2 Report did not consider the Hyalella growth
> endpoint during the development of the floating point percentile model

> (FPM). EPA has maintained that the Hyalella growth endpoint adds
> valuable information and thus should be included in the model.
>
> Regarding the evaluation of empirical data, the LWG has agreed to our
> recommended approach which was to evaluate all four endpoints
> (Hyalella growth and mortality; Chironomus growth and mortality) at
> the 10, 20 and 30% difference from control level. The LWG sought to

> address our concern about the use of the Hyalella growth endpoint by
> proposing the RSET one-hit/two-hit threshold for use in the predictive
> models. This proposal was not endorsed by the project team.
>
> On Friday afternoon, Burt and I spoke with John Toll and Helle
> Anderson about the evaluation of benthic risk. At the end of the
> discussion, we came up with the following approach.
>
> 1) Evaluate the empirical toxicity data as we have described - a hit
> is a statistically significant difference from control for any of the
> four endpoints.
> 2) Substitute total biomass for the growth endpoint for both the
> Hyalella and the chironomus tests.
> 3) Empirical data will be further refined by classifying the toxicity
> tests into minor (10%) moderate (20%) and severe effects (30%).
> 4) For the LRM and FPM, we will pool the growth (biomass) and
> mortality endpoints for chironomus and again for Hyalella.
> 5) Pooling will be based on use of the most sensitive endpoint
> (growth or mortality) resulting two LRM and two FPM models.
> 6) The evaluation of the bioassay data for the development of the
> predictive models will be based on the following hit thresholds:
> - Chironomus Growth - 30%
> - Chironomus Mortality - 20%
> - Hyalella Growth - 40%
> - Hyalella Mortality - 20%
> 7) These thresholds will apply to both the logistic and floating
> percentile models.
> 8) The results from these models will be equivalent to site specific
> probable effect levels.
> 9) The draft RI report will present an evaluation of the hit
> thresholds used in the predictive models. The evaluation will compare
> the separation of sediment chemistry distributions at the hit and no
> hit stations as a way to assess the utility of using lower hit
> thresholds in the predictive models, evaluate the reliability of the
> predictive models and make recommendations regarding the optimization
> of model performance.
> 10) The model results will be used in the conjunction of other lines
> of evidence in the baseline risk assessment and in the development of
> PRGs.
>
> Although the hit thresholds identified for the predictive models are
> higher than what we have discussed previously, we will perform
> analysis on the back end to assess the utility of using lower
> thresholds. This analysis will be presented in the draft baseline
> ecological risk assessment and the hit/no-hit thresholds will be
> adjusted as necessary prior to the final BERA. In my view, the hit
> threshold or thresholds selected for use in the predictive models are
> for the purpose of optimizing model performance. Due to the large
> number of sources and source types at the Portland Harbor site, the
> predictive model results do not necessarily match up well with the
> empirical bioassay results. In a perfect world, we would perform the
> necessary analysis to determine the optimum hit threshold or
> thresholds prior to running the model. However, the project schedule
> does not allow this approach. In any event, the predictive model
> results are only one line of evidence for evaluating risk to the
> benthic community and will be weighted accordingly in the baseline
> ecological risk assessment (BERA). These results will be used along
> with other lines of evidence (e.g., SQGs, application of benthic
> tissue TRVs and BSAFs) to identify areas that pose risk to the benthic
> community and develop sediment cleanup levels protective of the
> benthic community.
>
> Please let me know if you have any questions. I will cover this at
> this week's TCT.
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> Thanks, Eric
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